

Docket No.: 200206828-03 (Our ref.: 1509-514)

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AMENDMENTS TO THE SPECIFICATION:

The specification has been amended as follows:

Page 1, paragraph starting at line 6, has been amended as follows:

The present invention relates to media streaming, and more particularly relates to streaming in a case where delay on a stream transmission path becomes larger mid-way through the transmission path, such as the case where a media stream is transmitted to a client via a last-hop wireless cellular link. Note that, though a wireless cellular link is taken as an example of the transmission path of a large delay in the following explanations, the present invention is not limited thereto.

Page 1, paragraph starting at line 22, has been amended as follows:

Non-Patent Document 1, shown below, discloses that a wireless base station comprises an RTP monitoring agent after a shaping point (a flow control point). An RTP (Real-time Transfer Protocol) monitoring agent monitors a multimedia stream that arrives at the wireless base station and is to be transmitted via a wireless cellular link, and feeds back to a media server the information indicating the congestion status in a wired network from the media server to the wireless base station. The client that receives data packets wirelessly from the wireless base station transmits reception acknowledge information to the media server according to RTCP protocol.

Page 2, paragraph starting at line 19, has been amended as follows:

In this type of conventional technique, once a packet loss occurs, considerable time is required before packet loss resiliency is increased. In a case where packets

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containing an I-picture in a video stream is discarded ~~due to flow control~~ by network queues in response to congestion in the wired network and packets of multiple subsequent P-pictures are then transmitted via a last-hop wireless link, the client is unable to reconstruct these P-pictures since the I-picture needed for reference to reconstruct the P-pictures is not available. Furthermore, even when a P-picture is discarded, no subsequent P-pictures dependent on that P-picture can be reconstructed until the next I-picture is received. In general TCP communications, a packet that is lost is retransmitted based on feedback information. However, in streaming where the media is reconstructed and played back in real time, retransmission may be too late in such a case where the buffer size of the client is small. When packets are discarded due to the congestion in a wired network, reconstruction errors occur not only for the discarded packet but also for the P-pictures contained in subsequent packets successfully received.

Page 5, paragraph starting at line 16, has been amended as follows:

According to an embodiment of the present invention, the encoding device increases the frequency of I-pictures at least for the media stream transmitted to the destination client where the loss has occurred in response to detection of the packet loss based on the feedback information from the packet analysis apparatus.

Page 5, paragraph starting at line 21, has been amended as follows:

Furthermore, according to an embodiment of the present invention, the media delivery apparatus receives destination client feedback information regarding packet

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reception from a wireless terminal that is the destination of the media stream, and determines whether the packet loss has occurred in the wired transmission in the network or in the wireless transmission from the wireless base station based on the ~~destination~~ client feedback information and the feedback information from the packet analysis apparatus.

Page 7, paragraph starting at line 24, has been amended as follows:

When a media delivery request comes from a wireless terminal 19 such as a mobile phone, a portable terminal (PDA), a computer provided with a wireless communication device, the media delivery device 11 packetizes the media stream, attaches an RTP (Real-time Transport Protocol) header and an IP header thereto, and transmits this via a wired network 21. The packets are routed according to an Internet Protocol (IP), and arrive at a wireless base station 10. The IP is a connectionless communication protocol, and when congestion occurs on the network, overflowing packets in overflowing network queues may be discarded from the network.

Page 10, paragraph beginning at line 12, has been amended as follows:

The I-picture and the P-picture are each converted by DCT (Discrete Cosine Transform) into DCT coefficients. The DCT coefficients and motion vectors information are entropy coded. At this time, one picture is divided into 8×8-pixel blocks, and DCT is performed on each block. Four adjacent blocks are combined into one macroblock (MB), and multiple macroblocks are combined as one group of blocks (GOB). As shown in Fig. 4(B), multiple macroblocks are placed in one packet and transmitted.

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Page 14, paragraph starting at line 17, has been amended as follows:

The processing routine 111 adds the RTP packet with the RTP header, the UDP header, and the IP header, for transmission according to a UDP/IP protocol. The IP header includes the source address indicating the transmission source, and the destination address indicating the destination client. Furthermore, the UDP header includes the source port number indicating the port number of the transmission source, and the destination port number indicating the port number of the destination client.

Page 18, paragraph starting at line 18, has been amended as follows:

Depending on the construction of the wireless terminal 19, the wireless terminal 19 can transmit the ACK signal to the media delivery device 11. Specifically, a wireless terminal that conforms to the 3GPP standard cannot transmit ACK signals packets as the packet analysis device 15 does. When there is no need to conform with this standard, the wireless terminal can be constructed to transmit ACK signals packets. The feedback control section 35 compares the feedback information from the packet analysis device 15 with the information from the wireless terminal 19, whereby the quality of the wireless communication from the wireless base station 10 to the wireless terminal 19 can be known. When it is judged that the quality of the wireless communication is low, the feedback control section issues to the format switching section 29 an instruction to switch the media format to the format with the higher frequency of I-pictures. The formats for the media are not only two types. Many types of formats are available, and the format may be switched among many formats

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depending on the communication status. For example, when transmissions are being performed in a format with a high frequency of I-pictures, if sufficiently good communication status is detected, then the format can be switched to the format with the lower frequency of I-pictures. In this way, the media delivery device 11 can adjust the load of the stream transmission.

Page 36, paragraph starting at line 6, has been amended as follows:

Referring back to Fig. 9, ~~the feedback control section 35, based on the information contained in the reception report from the wireless base station 10, which is transferred over from the RTP processing section, determines which of the three transmission modes described above is appropriate, and then determines the transmission mode (157).~~

Page 36, paragraph starting at line 12, has been amended as follows:

—The the feedback control section 35, based on the RTP packet reception acknowledge signal (ACK) that is sent over from the second feedback section 73, determines whether packets in the media stream are lost (141). When it is detected that a packet is lost, the feedback control section 35 then determines whether or not the communications are being conducted in Mode 1 or Mode 2 (151). When the communications are being conducted in Mode 1 or Mode 2, the packet retransmission procedures explained with respect to the blocks 143, 145, 147, and 149 in Fig. 6 are then executed (153). When the communications are being conducted in Mode 3, if

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possible and desirable, the error correction code to be used is modified to a more appropriate one (155).

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